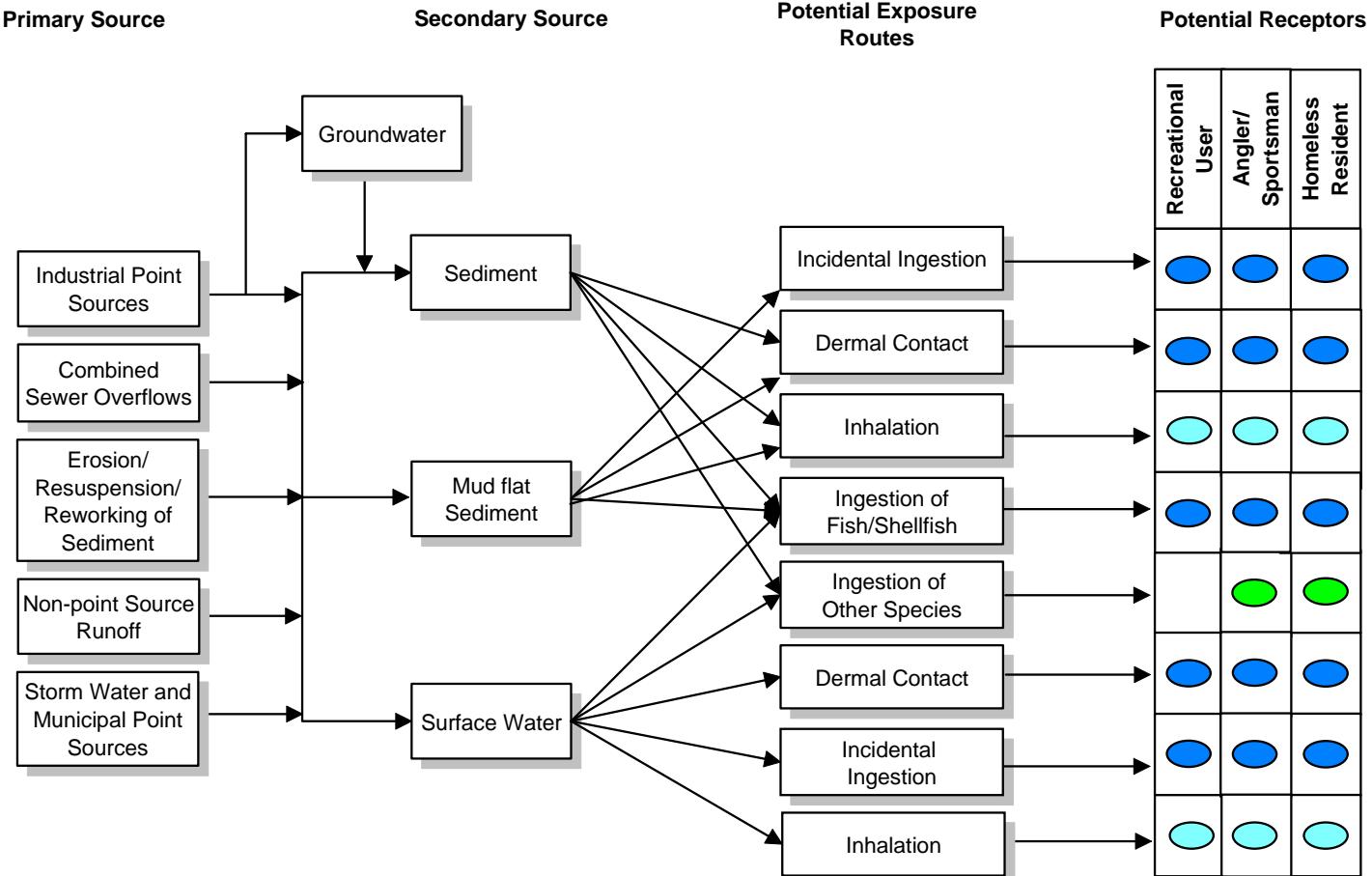


Appendix A

Supporting Tables for Human Health Risk Assessment Summary



Legend

- Complete, Quantitative Pathway
- Complete, Qualitative Pathway
- Potentially Complete Pathway

Notes

Subject to Attorney Client, Work Product, Deliberative Process and/or Joint Prosecution Privileges; FOIA/OPRA Exempt



Human Health Conceptual Site Model
Lower Passaic River Restoration Project

Figure A-1

September 2007

Table A-1: Selection of Human Health Exposure Pathways – Passaic River

Scenario Timeframe	Source Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment	Biota Tissue	Fish from 8-mile stretch of Passaic River	Angler/Sportsman	Adult, Adolescent, Child	Ingestion	Quantitative	Many site-related contaminants in sediment have been shown to bioaccumulate in fish. Assumes receptor will consume fish caught from Passaic River and share it with family members.
				Recreational User ¹	Adult, Adolescent, Child	Ingestion	Quantitative	
				Homeless Resident	Adult, Adolescent, Child	Ingestion	Quantitative	
			Shellfish from 8-mile stretch of Passaic River	Angler/Sportsman	Adult, Adolescent, Child	Ingestion	Quantitative	Many site-related contaminants in sediment have been shown to bioaccumulate in shellfish. Assumes receptor will consume shellfish caught from Passaic River and share it with family members. Shellfish ultimately evaluated may include clams, mussels, and crabs.
				Recreational User ¹	Adult, Adolescent, Child	Ingestion	Quantitative	
				Homeless Resident	Adult, Adolescent, Child	Ingestion	Quantitative	
			Other species (waterfowl, snapping turtle, frog, etc.) from 8-mile stretch of Passaic River	Angler/Sportsman	Adult, Adolescent, Child	Ingestion	Qualitative	The possibility that individuals hunt and consume other species (e.g., waterfowl, frogs, or turtles) will be investigated. Assumes receptors will consume other species caught from Passaic River and share meat with family members. There are limitations associated with a quantitative assessment of this pathway due to the lack of information on tissue concentrations in these species.
				Recreational User ¹	Adult, Adolescent, Child	Ingestion	Qualitative	
				Homeless Resident	Adult, Adolescent, Child	Ingestion	Qualitative	

Table A-1: Selection of Human Health Exposure Pathways – Passaic River

Scenario Timeframe	Source Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment	Sediment	Sediments from 8-mile stretch of Passaic River	Angler/Sportsman	Adult, Adolescent	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Angler/Sportsman may contact sediment while fishing or crabbing from the river bank. Inhalation may occur if activities occur in mudflat areas and volatiles are present. Assumes that children accompanying adult angler would be engaging in recreational activities as described for recreational user. Reserved for evaluation in the Baseline Risk Assessment.
				Recreational User ¹	Adult, Adolescent, Child	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Recreational Users may ingest or otherwise come in contact with contaminated sediment while engaging in activities (swimming, wading, boating, etc.) along the river. Inhalation may also occur if activities occur in mudflat areas. Reserved for evaluation in the Baseline Risk Assessment.
				Homeless Resident	Adult, Adolescent, Child	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Resident will refer to transient homeless individuals living in makeshift shelters along the river bank that may contact river sediments during daily activities. Reserved for evaluation in the Baseline Risk Assessment.

Table A-1: Selection of Human Health Exposure Pathways – Passaic River

Scenario Timeframe	Source Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current/Future	Sediment	Water	Surface water from 8-mile stretch of Passaic River	Angler/Sportsman	Adult, Adolescent	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Angler/Sportsman may contact surface water while fishing or crabbing from the river bank. Inhalation may occur if volatiles are present. Assumes that children accompanying adult angler would be engaging in recreational activities as described for recreational user. Reserved for evaluation in the Baseline Risk Assessment.
				Recreational User ¹	Adult, Adolescent, Child	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Recreational Users will consist of a combined exposure for child, adolescent, and adult who may ingest or otherwise come in contact with contaminated surface water while engaging in activities (swimming, wading, boating) along the river. Inhalation may also occur if activities occur in mudflat areas. Surface water from the river is not used as a domestic water supply. Reserved for evaluation in the Baseline Risk Assessment.
				Homeless Resident	Adult, Adolescent, Child	Dermal Contact, Incidental Ingestion, Inhalation	Quantitative	Surface water from the river is not used as a domestic water supply; therefore, resident will refer to homeless individuals living in makeshift shelters along the river bank. Reserved for evaluation in the Baseline Risk Assessment.

¹ The recreational user encompasses three different types of recreational activities: swimming, wading, and sculling.

Table A-2: Non-carcinogenic Toxicity Data

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD: Target Organ(s)	
		Value	Units			Source(s)	Date(s)
TCDD TEQ (PCDD/F)	--	--	--	--	--	IRIS	8/23/2006
TCDD TEQ (PCBs)	--	--	--	--	--	IRIS	8/23/2006
Total PCBs ¹	Chronic	2.0E-05	mg/kg-day	Immune System, eye	300	IRIS	8/23/2006
4,4'-DDD	--	--	--	--	--	IRIS	8/23/2006
4,4'-DDE	--	--	--	--	--	IRIS	8/23/2006
4,4'-DDT	Chronic	5.0E-04	mg/kg-day	liver	100	IRIS	8/23/2006
Total Chlordane	Chronic	5.0E-04	mg/kg-day	liver	300	IRIS	8/23/2006
Dieldrin	Chronic	5.0E-05	mg/kg-day	liver	100	IRIS	8/23/2006
Methyl mercury	Chronic	1.0E-04	mg/kg-day	central nervous system	10	IRIS	8/23/2006

¹ Based on the non-cancer toxicity values for Aroclor 1254.

Table A-3: Carcinogenic Toxicity Data

Chemical of Potential Concern	Oral Cancer Slope Factor		Weight of Evidence/ Cancer Guideline Description ¹	Oral CSF	
	Value	Units		Source(s)	Date(s)
TCDD TEQ (PCDD/F)	1.50E+05	(mg/kg-day) ⁻¹	B2	HEAST	07/31/97
TCDD TEQ (PCBs)	1.50E+05	(mg/kg-day) ⁻¹	B2	HEAST	07/31/97
Total PCBs	2.00E+00	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
4,4'-DDD	2.40E-01	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
4,4'-DDE	3.40E-01	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
4,4'-DDT	3.40E-01	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
Total Chlordane	3.50E-01	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
Dieldrin	1.60E+01	(mg/kg-day) ⁻¹	B2	IRIS	8/23/2006
Methyl mercury	--	--	C	IRIS	8/23/2006

¹ Weight of evidence: B2 - probable human carcinogen; C- possible human carcinogen

Table A-4: Exposure Point Concentration Summary for Fish - Current Scenario

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95 Percent Upper Confidence Limit (Distribution) ¹	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Fish	TCDD-TEQ (PCDD/F)	mg/kg	0.000200	NA	0.0005000	0.00025	mg/kg	97.5% Chebyshev	Nonparametric
	TCDD-TEQ (PCBs)	mg/kg	0.000060	Log	0.0002200	0.00008	m/gkg	H-UCL	Lognormal
	Total PCBs	mg/kg	2.85	Gamma	13.99	3.42	mg/kg	Approximate Gamma	Gamma Distribution
	4,4'-DDD	mg/kg	0.12	Log	0.68	0.15	mg/kg	H-UCL	Lognormal
	4,4'-DDE	mg/kg	0.25	Log	1.69	0.303	mg/kg	H-UCL	Lognormal
	4,4'-DDT	mg/kg	0.06	Gamma	0.38	0.076	mg/kg	Approximate Gamma	Gamma Distribution
	Total Chlordane	mg/kg	0.73	NA	3.77	1.8	mg/kg	99% Chebyshev	Nonparametric
	Dieldrin	mg/kg	0.02	Gamma	0.14	0.027	mg/kg	Approximate Gamma	Gamma Distribution
	Methyl mercury	mg/kg	0.32	Gamma	0.93	0.347	mg/kg	Approximate Gamma	Gamma Distribution

¹ NA - distribution not determined; Log - lognormal distribution; Gamma - gamma distribution.

Table A-5: Exposure Point Concentration Summary for Crab – Current Scenario

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean	95 Percent Upper Confidence Limit (Distribution) ¹	Maximum Concentration (Qualifier)	Exposure Point Concentration			
						Value	Units	Statistic	Rationale
Crab	TCDD TEQ (PCDD/F)	mg/kg	0.0001	NA	0.000750	0.0002	mg/kg	97.5% Chebyshev	Nonparametric
	TCDD TEQ (PCBs)	mg/kg	0.00009	NA	0.004000	0.0004	mg/kg	97.5% Chebyshev	Nonparametric
	Total PCBs	mg/kg	2.4	NA	14	5.2	mg/kg	97.5% Chebyshev	Nonparametric
	4,4'-DDD	mg/kg	0.053	NA	0.82	0.138	mg/kg	97.5% Chebyshev	Nonparametric
	4,4'-DDE	mg/kg	0.137	NA	1.74	0.317	mg/kg	97.5% Chebyshev	Nonparametric
	4,4'-DDT	mg/kg	0.078	NA	0.48	0.235	mg/kg	99% Chebyshev	Nonparametric
	Total Chlordane	mg/kg	0.019	NA	0.20	0.037	mg/kg	97.5% Chebyshev	Nonparametric
	Dieldrin	mg/kg	0.009	NA	0.03	0.018	mg/kg	97.5% Chebyshev	Nonparametric
	Methyl mercury	mg/kg	0.087	Log	0.28	0.097	mg/kg	H-UCL	Lognormal

¹ NA - distribution not determined; Log - lognormal.

Table A-6: Exposure Parameter Values Used for Daily Intake for the Adult – Fish Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _f	Chemical Concentration in Fish	mg/kg wet weight	Site-specific		Site-specific		
	IR _f	Ingestion rate of Fish	g/day	25	USEPA, 1997	8	USEPA, 1997	Intake = $\frac{C_f \times IR_f \times EF \times FI \times (1 - Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Assumed to be one-half RME	
	ED	Exposure Duration ⁽²⁾	years	24	USEPA, 1989	9	USEPA, 1989	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in fish	Chemical-specific	--	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	70	Mean adult body weight, males and females (USEPA, 1989)	70	Mean adult body weight, males and females (USEPA, 1989)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	8760	ED (years) x 365 days/year	3285	ED (years) x 365 days/year	

Table A-7: Exposure Parameter Values Used for Daily Intake for the Adult – Crab Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _b	Chemical Concentration in Crab	mg/kg wet weight	Site-specific		Site-specific		
	IR _b	Ingestion rate of Crab	g/day	23	Burger, 2002	16	Burger, 2002	$\text{Intake} = \frac{C_b \times IR_b \times EF \times FI \times (1 - Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Based on an annualized ingestion rate	
	ED	Exposure Duration	years	24	USEPA, 1989	9	USEPA, 1989	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in crab	0	No data available	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	70	Mean adult body weight, males and females (USEPA, 1989)	70	Mean adult body weight, males and females (USEPA, 1989)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	8760	ED (years) x 365 days/year	3285	ED (years) x 365 days/year	

Table A-8: Exposure Parameter Values Used for Daily Intake for the Adolescent – Fish Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _f	Chemical Concentration in Fish	mg/kg wet weight	Site-specific		Site-specific		
	IR _f	Ingestion rate of Fish	g/day	17	2/3 the adult ingestion rate (USEPA, 1997)	5	2/3 the adult ingestion rate (USEPA, 1997)	Intake = $\frac{C_f \times IR_f \times EF \times FI \times (1 - Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Based on an annualized ingestion rate	
	ED	Exposure Duration	years	9	Assumed	6	EPA default (USEPA, 1991)	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in fish	Chemical-specific	--	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	54.5	Mean weight, males and females age 10-17 (USEPA, 2002a)	54.5	Mean weight, males and females age 10-17 (USEPA, 2002a)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	3285	ED (years) x 365 days/year	1825	ED (years) x 365 days/year	

Table A-9: Exposure Parameter Values Used for Daily Intake for the Adolescent – Crab Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _b	Chemical Concentration in Crab	mg/kg wet weight	Site-specific		Site-specific		
	IR _b	Ingestion rate of Crab	g/day	15	2/3 the adult ingestion rate (USEPA, 1997)	11	2/3 the adult ingestion rate (USEPA, 1997)	$\text{Intake} = \frac{C_b \times IR_b \times EF \times FI \times (1 - Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Based on an annualized ingestion rate	
	ED	Exposure Duration	years	9	Assumed (from age 10 through 18)	6	Standard EPA default (USEPA, 1991)	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in fish	Chemical-specific	--	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	54.5	Mean weight, males and females age 10-17 (USEPA, 2002a)	54.5	Mean weight, males and females age 10-17 (USEPA, 2002a)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	3285	ED (years) x 365 days/year	1825	ED (years) x 365 days/year	

Table A-10: Exposure Parameter Values Used for Daily Intake for the Child – Fish Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _f	Chemical Concentration in Fish	mg/kg wet weight	Site-specific		Site-specific		
	IR _f	Ingestion rate of Fish	g/day	8	1/3 of the adult ingestion rate (USEPA, 1997)	3	1/3 of the adult ingestion rate (USEPA, 1997)	Intake = $\frac{C_f \times IR_f \times EF \times FI \times (1-Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Based on an annualized ingestion rate	
	ED	Exposure Duration	years	6	EPA default (USEPA, 1991)	3	Assumed	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in fish	Chemical-specific	--	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	15	Mean child weight (USEPA, 1989)	15	Mean child weight (USEPA, 1989)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	2190	ED (years) x 365 days/year	1095	ED (years) x 365 days/year	

Table A-11: Exposure Parameter Values Used for Daily Intake for the Child – Crab Ingestion

Exposure Route	Parameter Code	Parameter Definition	Units	RME Value	RME Rationale/Reference	CT Value	CT Rationale/Reference	Intake Equation/Model Name
Ingestion	C _b	Chemical Concentration in Crab	mg/kg wet weight	Site-specific		Site-specific		
	IR _b	Ingestion rate of Crab	g/day	8	1/3 of the adult ingestion rate (USEPA, 1997)	5	1/3 of the adult ingestion rate (USEPA, 1997)	Intake = $\frac{C_b \times IR_b \times EF \times FI \times (1-Loss) \times ED \times CF}{BW \times AT}$
	FI	Fraction from Source	unitless	1	Assumes 100% exposure is from Passaic River	1	Assumes 100% exposure is from Passaic River	
	EF	Exposure Frequency	days/year	365	USEPA, 1989	365	Based on an annualized ingestion rate	
	ED	Exposure Duration	years	6	Standard EPA default (USEPA, 1991)	3	Assumed	
	Loss	Cooking Loss	g/g	0	Assumes 100% chemical remains in crab	0	No data available	
	CF	Conversion Factor	kg/g	1.00E-03	--	1.00E-03	--	
	BW	Body Weight	kg	15	Standard EPA default (USEPA, 1991)	15	Standard EPA default (USEPA, 1991)	
	AT-C	Averaging Time (Cancer)	days	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	25550	70-year lifetime exposure x 365 days/year (USEPA, 1989)	
	AT-NC	Averaging Time (Non-cancer)	days	2190	ED (years) x 365 days/year	1095	ED (years) x 365 days/year	

Table A-12: Summary of RME Risk/Hazard for an Adult

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	5.E-03	ND
TCDD TEQ (PCBs)	1.E-03	ND
Total PCBs	8.E-04	61
4,4'-DDD	4.E-06	ND
4,4'-DDE	1.E-05	ND
4,4'-DDT	3.E-06	0.05
Total Chlordane	8.E-05	1
Dieldrin	5.E-05	0.2
Methyl mercury	ND	1
Exposure Route Total	7.E-03	64
Exposure Point Total	7.E-03	64
Exposure Medium Total	7.E-03	64
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	3.E-03	ND
TCDD TEQ (PCBs)	7.E-03	ND
Total PCBs	1.E-03	85
4,4'-DDD	4.E-06	ND
4,4'-DDE	1.E-05	ND
4,4'-DDT	9.E-06	0.2
Total Chlordane	1.E-06	0.02
Dieldrin	3.E-05	0.1
Methyl mercury	ND	0.3
Exposure Route Total	1.E-02	86
Exposure Point Total	1.E-02	86
Exposure Medium Total	1.E-02	86

ND - not determined because toxicity values are not available for this exposure route.

Table A-13: Summary of RME Risk/Hazard for an Adolescent

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	1.E-03	ND
TCDD TEQ (PCBs)	5.E-04	ND
Total PCBs	3.E-04	52
4,4'-DDD	1.E-06	ND
4,4'-DDE	4.E-06	ND
4,4'-DDT	1.E-06	0.05
Total Chlordane	2.E-05	1
Dieldrin	2.E-05	0.2
Methyl mercury	ND	1
Exposure Route Total	2.E-03	55
Exposure Point Total	2.E-03	55
Exposure Medium Total	2.E-03	55
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	1.E-03	ND
TCDD TEQ (PCBs)	2.E-03	ND
Total PCBs	4.E-04	72
4,4'-DDD	1.E-06	ND
4,4'-DDE	4.E-06	ND
4,4'-DDT	3.E-06	0.1
Total Chlordane	5.E-07	0.02
Dieldrin	1.E-05	0.1
Methyl mercury	ND	0.3
Exposure Route Total	4.E-03	72
Exposure Point Total	4.E-03	72
Exposure Medium Total	4.E-03	72

ND - not determined because a toxicity value is not available for this exposure route.

Table A-14: Summary of RME Risk/Hazard for a Child

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	2.E-03	ND
TCDD TEQ (PCBs)	6.E-04	ND
Total PCBs	3.E-04	95
4,4'-DDD	2.E-06	ND
4,4'-DDE	5.E-06	ND
4,4'-DDT	1.E-06	0.1
Total Chlordane	3.E-05	2
Dieldrin	2.E-05	0.3
Methyl mercury	ND	2
Exposure Route Total	3.E-03	99
Exposure Point Total	3.E-03	99
Exposure Medium Total	3.E-03	99
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	1.E-03	ND
TCDD TEQ (PCBs)	3.E-03	ND
Total PCBs	5.E-04	139
4,4'-DDD	2.E-06	ND
4,4'-DDE	5.E-06	ND
4,4'-DDT	4.E-06	0.3
Total Chlordane	6.E-07	0.04
Dieldrin	1.E-05	0.2
Methyl mercury	ND	0.5
Exposure Route Total	5.E-03	140
Exposure Point Total	5.E-03	140
Exposure Medium Total	5.E-03	140

ND - not determined because a toxicity value is unavailable for this exposure route.

Table A-15: Summary of CTE Risk/Hazard for an Adult

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	3.E-04	ND
TCDD TEQ (PCBs)	9.E-05	ND
Total PCBs	4.E-05	16
4,4'-DDD	4.E-07	ND
4,4'-DDE	1.E-06	ND
4,4'-DDT	3.E-07	0.01
Total Chlordane	6.E-06	0.3
Dieldrin	4.E-06	0.04
Methyl mercury	ND	0.4
Exposure Route Total	4.E-04	16
Exposure Point Total	4.E-04	16
Exposure Medium Total	4.E-04	16
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	9.E-04	ND
TCDD TEQ (PCBs)	2.E-03	ND
Total PCBs	2.E-04	59
4,4'-DDD	1.E-06	ND
4,4'-DDE	3.E-06	ND
4,4'-DDT	2.E-06	0.1
Total Chlordane	4.E-07	0.02
Dieldrin	8.E-06	0.1
Methyl mercury	ND	0.2
Exposure Route Total	3.E-03	60
Exposure Point Total	3.E-03	60
Exposure Medium Total	3.E-03	60

ND - not determined because a toxicity value is not available for this exposure route.

Table A-16: Summary of CTE Risk/Hazard for an Adolescent

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	2.E-04	ND
TCDD TEQ (PCBs)	5.E-05	ND
Total PCBs	2.E-05	13
4,4'-DDD	2.E-07	ND
4,4'-DDE	6.E-07	ND
4,4'-DDT	2.E-07	0.01
Total Chlordane	4.E-06	0.2
Dieldrin	3.E-06	0.04
Methyl mercury	ND	0.3
Exposure Route Total	2.E-04	14
Exposure Point Total	2.E-04	14
Exposure Medium Total	2.E-04	14
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	5.E-04	ND
TCDD TEQ (PCBs)	1.E-03	ND
Total PCBs	9.E-05	52
4,4'-DDD	6.E-07	ND
4,4'-DDE	2.E-06	ND
4,4'-DDT	1.E-06	0.1
Total Chlordane	2.E-07	0.01
Dieldrin	5.E-06	0.1
Methyl mercury	ND	0.2
Exposure Route Total	2.E-03	53
Exposure Point Total	2.E-03	53
Exposure Medium Total	2.E-03	53

ND - not determined because a toxicity value is not available for this exposure route.

Table A-17: Summary of CTE Risk/Hazard for a Child

Chemical	Cancer Risk	Hazard Quotient
<i>Fish Ingestion</i>		
TCDD TEQ (PCDD/F)	1.E-04	ND
TCDD TEQ (PCBs)	5.E-05	ND
Total PCBs	2.E-05	24
4,4'-DDD	2.E-07	ND
4,4'-DDE	5.E-07	ND
4,4'-DDT	1.E-07	0.02
Total Chlordane	3.E-06	0.4
Dieldrin	2.E-06	0.1
Methyl mercury	ND	0.6
Exposure Route Total	2.E-04	25
Exposure Point Total	2.E-04	25
Exposure Medium Total	2.E-04	25
<i>Crab Ingestion</i>		
TCDD TEQ (PCDD/F)	4.E-04	ND
TCDD TEQ (PCBs)	9.E-04	ND
Total PCBs	7.E-05	87
4,4'-DDD	5.E-07	ND
4,4'-DDE	2.E-06	ND
4,4'-DDT	1.E-06	0.2
Total Chlordane	2.E-07	0.02
Dieldrin	4.E-06	0.1
Methyl mercury	ND	0.3
Exposure Route Total	1.E-03	87
Exposure Point Total	1.E-03	87
Exposure Medium Total	1.E-03	87

ND - not determined because a toxicity value is not available for this exposure route.

Appendix B

Supporting Tables for Ecological Risk Assessment Summary

Table B-1: Ecological Receptors and Exposure Pathways of Concern

Exposure Media	Sensitive Environment (Y/N)	Receptor	Endangered/Threatened Species (Y/N)	Potential Exposure Routes	Assessment Endpoints	Measurement Endpoints
Sediment	N	Benthic Organisms	N	Ingestion and dermal contact with chemicals in sediment, ingestion of contaminated prey, ingestion and dermal contact with contaminated surface water	Protection and maintenance (<i>i.e.</i> , survival, growth, and reproduction) of benthic invertebrate communities that serve as a forage base for fish and wildlife populations.	Comparison of site sediment concentrations to sediment benchmarks
Mud Flat Sediments		Macroinvertebrates: Blue Crab, Grass Shrimp				
Contaminated Prey	N	Demersal Fish: Mummichog	N	Ingestion of contaminated prey, dermal contact with surface water, and incidental ingestion of surface water.	Protection and maintenance (<i>i.e.</i> , survival, growth, and reproduction) of demersal, benthivorous fish populations that serve as a forage base for fish and wildlife populations.	Residue based assessment: Comparison of tissue concentrations to CBRs.
Contaminated Prey	N	Pelagic Fish: White Perch/American Eel	N	Ingestion of contaminated prey, dermal contact with surface water, and incidental ingestion of surface water.	Protection and maintenance (<i>i.e.</i> , survival, growth, and reproduction) of piscivorous, or semi-piscivorous fish populations that serve as a forage base for wildlife populations or sports fishery.	Residue based assessment: Comparison of tissue concentrations to CBRs.
Contaminated Prey	N	Aquatic Bird: Great Blue Heron	N	Ingestion of contaminated prey, dermal contact with surface water, and incidental ingestion of sediment.	Protection and maintenance (<i>i.e.</i> , survival, growth, and reproduction) of aquatic bird populations.	Dose Assessment: Species-specific modeled exposures compared to TRVs.
		Aquatic Bird:Herring Gull Embryo		Maternal transfer of chemicals from maternal ingestion of contaminated prey, dermal contact with surface water, and incidental ingestion of sediment.		
Contaminated Prey	N	Mink	N	Ingestion of contaminated prey, surface water, and incidental ingestion of sediment.	Protection and maintenance (<i>i.e.</i> , survival, growth, and reproduction) of piscivorous mammal populations.	Dose Assessment: Species-specific modeled exposures compared to TRVs.

Table B-2: Exposure Point Concentration Summary for Sediment

Scenario Timeframe:	Current
Media:	Sediment
Exposure Media	Sediment

Chemical of Potential Ecological Concern	Units	Concentration					Frequency of Detect	Exposure Point Concentration (ppm)	Statistic ⁽¹⁾
		Minimum (ppm)	Minimum Qualifier	Maximum (ppm)	Maximum Qualifier	Arithmetic Mean			
Copper	µg/g	12		2470		217	234/234	236	95% Upper Confidence Limit
Dieldrin	µg/g	0.0014	DJ	0.141	PDJ	0.014	106/236	0.019	95% Upper Confidence Limit
Lead	µg/g	4.4		1550		328	225/225	375	95% Upper Confidence Limit
Mercury	µg/g	0.05	U	11	M	3.1	230/232	3.6	95% Upper Confidence Limit
LMW PAH	µg/g	0.007		1411		13.7	232 ⁽²⁾	41	95% Upper Confidence Limit
HMW PAH	µg/g	1.8		1373		34.4	231 ⁽²⁾	61	95% Upper Confidence Limit
Total PCBs (sum of Aroclors) ⁽³⁾	µg/g	0.056		17.4		1.3	238 ⁽²⁾	1.8	95% Upper Confidence Limit
Total DDT ⁽⁴⁾	µg/g	0.0061		6.0		0.23	245 ⁽²⁾	0.38	95% Upper Confidence Limit
TCDD TEQ (PCDD/F)	Mammal	µg/g	0.0000036		0.020	0.00078	232 ⁽²⁾	0.0016	95% Upper Confidence Limit
	Bird	µg/g	0.0000016		0.025	0.00087	232 ⁽²⁾	0.0018	95% Upper Confidence Limit
	Fish	µg/g	0.0000016		0.020	0.00078	232 ⁽²⁾	0.0016	95% Upper Confidence Limit
TCDD TEQ (PCB)	Mammal	µg/g	0.00000081		0.00017	0.000036	230 ⁽²⁾	0.000045	95% Upper Confidence Limit
	Bird	µg/g	0.00000027		0.0036	0.0054	230 ⁽²⁾	0.00075	95% Upper Confidence Limit
	Fish	µg/g	0.00000014		0.000017	0.0000030	230 ⁽²⁾	0.0000038	95% Upper Confidence Limit

⁽¹⁾ 95 percent UCLs calculated based on the data queries from PREmis and Contaminant Assessment and Reduction Project databases; samples included in the 95 percent UCL calculations are listed in Attachment 1 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b). 95 percent UCLs on the mean calculated using USEPA ProUCL software (Version 3.0); output files are included in Attachment 3 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b).

⁽²⁾ Frequency of detects could not be determined for calculated totals. Not all constituents that make up the aggregate were detected in all of the samples.

⁽³⁾ Total PCBs represent the non-dioxin-like PCBs.

⁽⁴⁾ The EPC for Total DDT is less than the sum of the EPCs for DDD, DDE, and DDT as a result of calculating 95 percent UCLs.

µg/g = microgram per gram (equivalent to ppm = parts per million)

Table B-3: Exposure Point Concentration Summary for Crab Tissue

Scenario Timeframe:	Current
Media:	Sediment
Exposure Media	Crab Tissue ⁽¹⁾

Chemical of Potential Ecological Concern	Units	Concentration					Frequency of Detect	Exposure Point Concentration (ppm)	Statistic ⁽²⁾
		Minimum (ppm)	Minimum Qualifier	Maximum (ppm)	Maximum Qualifier	Arithmetic Mean			
Copper	µg/g	8.4		78.5		30.4	64/64	35.3	95% Upper Confidence Limit
Dieldrin	µg/g	0.00075		0.10		0.11	14/77	0.022	95% Upper Confidence Limit
Lead	µg/g	0.055	U	2.4		0.46	61/71	0.55	95% Upper Confidence Limit
Mercury	µg/g	0.025	NJL	0.28		0.088	79/86	0.097	95% Upper Confidence Limit
LMW PAH	µg/g	0.0082		0.84		0.10	74 ⁽³⁾	0.15	95% Upper Confidence Limit
HMW PAH	µg/g	0.012		0.76		0.11	73 ⁽³⁾	0.16	95% Upper Confidence Limit
Total PCBs (sum of Aroclors) ⁽⁴⁾	µg/g	0.082		14		2.7	79 ⁽³⁾	5.5	95% Upper Confidence Limit
Total DDT ⁽⁵⁾	µg/g	0.0034		2.6		0.26	80 ⁽³⁾	0.56	95% Upper Confidence Limit
TCDD TEQ (PCDD/F)	Mammal	0.0000023		0.00075		0.00012	75 ⁽³⁾	0.00022	95% Upper Confidence Limit
	Bird	0.0000036		0.00093		0.000150	75 ⁽³⁾	0.00027	95% Upper Confidence Limit
	Fish	0.0000023		0.00074		0.00012	75 ⁽³⁾	0.00022	95% Upper Confidence Limit
TCDD TEQ (PCB)	Mammal	0.00000046		0.0036		0.00011	76 ⁽³⁾	0.00044	95% Upper Confidence Limit
	Bird	0.0000020		0.025		0.00070	76 ⁽³⁾	0.00280	95% Upper Confidence Limit
	Fish	0.00000022		0.00021		0.000064	76 ⁽³⁾	0.000025	95% Upper Confidence Limit

⁽¹⁾ EPC derived from entire blue crab data (including hepatopancreas)

⁽²⁾ 95 percent UCLs calculated based on the data queries from PREmis and Contaminant Assessment and Reduction Project databases; samples included in the 95 percent UCL calculations are listed in Attachment 1 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b). 95 percent UCLs on the mean calculated using USEPA ProUCL software (Version 3.0); output files are included in Attachment 3 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b).

⁽³⁾ Frequency of detects could not be determined for calculated totals. Not all constituents that make up the aggregate were detected in all of the samples.

⁽⁴⁾ Total PCBs represent the non-dioxin-like PCBs.

⁽⁵⁾ The EPC for total DDT is less than the sum of the EPCs for DDD, DDE, and DDT as a result of calculating 95 percent UCLs.

µg/g = microgram per gram (equivalent to ppm = parts per million)

Table B-4: Exposure Point Concentration Summary for Mummichog Tissue

Scenario Timeframe:	Current
Media:	Sediment
Exposure Media	Mummichog Tissue

Chemical of Potential Ecological Concern	Units	Concentration					Frequency of Detect	Exposure Point Concentration (ppm)	Statistic ⁽¹⁾
		Minimum (ppm)	Minimum Qualifier	Maximum (ppm)	Maximum Qualifier	Arithmetic Mean			
Copper	µg/g	1.9	B	7.2	EJ	3.7	58/58	3.9	95% Upper Confidence Limit
Dieldrin	µg/g	0.0017	U	0.011	P	0.0031	10/61	0.0043	95% Upper Confidence Limit
Lead	µg/g	0.13	U	2.8		0.71	25/30	1.2	95% Upper Confidence Limit
Mercury	µg/g	0.019	J	0.15		0.039	63/67	0.042 ⁽²⁾	95% Upper Confidence Limit
LMW PAH	µg/g	0.030		0.42		0.13	61 ⁽³⁾	0.17	95% Upper Confidence Limit
HMW PAH	µg/g	0.0010		0.11		0.061	61 ⁽³⁾	0.06	95% Upper Confidence Limit
Total PCBs (sum of Aroclors) ⁽⁴⁾	µg/g	0.12		1.2		0.67	61 ⁽³⁾	0.72	95% Upper Confidence Limit
Total DDT ⁽⁵⁾	µg/g	0.00046		0.37		0.074	62 ⁽³⁾	0.088	95% Upper Confidence Limit
TCDD TEQ (PCDD/F)	Mammal	0.0000056		0.00084		0.000078	62 ⁽³⁾	0.00015	95% Upper Confidence Limit
	Bird	0.0000067		0.00084		0.000081	62 ⁽³⁾	0.00015	95% Upper Confidence Limit
	Fish	0.0000055		0.00084		0.000078	62 ⁽³⁾	0.00014	95% Upper Confidence Limit
TCDD TEQ (PCB)	Mammal	0.0000019		0.000043		0.000026	61 ⁽³⁾	0.000027	95% Upper Confidence Limit
	Bird	0.0000042		0.00057		0.00016	61 ⁽³⁾	0.000020	95% Upper Confidence Limit
	Fish	0.00000095		0.000033		0.000016	61 ⁽³⁾	0.0000017	95% Upper Confidence Limit

⁽¹⁾ 95 percent UCLs calculated based on the data queries from PREmis and Contaminant Assessment and Reduction Project databases; samples included in the 95 percent UCL calculations are listed in Attachment 1 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b). 95 percent UCLs on the mean calculated using USEPA ProUCL software (Version 3.0); output files are included in Attachment 3 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b).

⁽²⁾ In the instance when ProUCL recommended more than one value, the first value (Student's-t UCL) was selected.

⁽³⁾ Frequency of detects could not be determined for calculated totals. Not all constituents that make up the aggregate were detected in all of the samples.

⁽⁴⁾ Total PCBs represent the non-dioxin-like PCBs.

⁽⁵⁾ The EPC for total DDT is less than the sum of the EPCs for DDD, DDE, and DDT as a result of calculating 95 percent UCLs.

µg/g = microgram per gram (equivalent to ppm = parts per million)

Table B-5: Exposure Point Concentration Summary for American Eel/White Perch

Scenario Timeframe:	Current
Media:	Sediment
Exposure Media	American Eel/White Perch Tissue ⁽¹⁾

Chemical of Potential Ecological Concern	Units	Concentration					Frequency of Detect	Exposure Point Concentration (ppm)	Statistic ⁽²⁾
		Minimum (ppm)	Minimum Qualifier	Maximum (ppm)	Maximum Qualifier	Arithmetic Mean			
Copper	µg/g	0.31	B	36.7		8.8	38/38	24.8	95% Upper Confidence Limit
Dieldrin	µg/g	0.0003	U	0.140		0.022	38-77	0.027	95% Upper Confidence Limit
Lead	µg/g	0.055	U	1.6		0.40	17/29	0.63	95% Upper Confidence Limit
Mercury	µg/g	0.079		0.93		0.32	87/87	0.35	95% Upper Confidence Limit
LMW PAH	µg/g	0.023		0.80		0.15	64 ⁽³⁾	0.17	95% Upper Confidence Limit
HMW PAH	µg/g	0.011		0.35		0.087	64 ⁽³⁾	0.10	95% Upper Confidence Limit
Total PCBs (sum Aroclors) ⁽⁴⁾	µg/g	0.083		14		2.9	77 ⁽³⁾	3.4	95% Upper Confidence Limit
Total DDT ⁽⁵⁾	µg/g	0.023		2.5		0.42	77 ⁽³⁾	0.52	95% Upper Confidence Limit
TCDD TEQ (PCDD/F)	Mammal	0.0000052		0.00048		0.00016	66 ⁽³⁾	0.00025	95% Upper Confidence Limit
	Bird	0.0000051		0.00052		0.00017	66 ⁽³⁾	0.00028	95% Upper Confidence Limit
	Fish	0.0000051		0.00048		0.00016	66 ⁽³⁾	0.00025	95% Upper Confidence Limit
TCDD TEQ (PCB)	Mammal	0.000013		0.00022		0.000065	77 ⁽³⁾	0.000076	95% Upper Confidence Limit
	Bird	0.000030		0.0015		0.000058	77 ⁽³⁾	0.000086	95% Upper Confidence Limit
	Fish	8.1E-07		0.000016		0.0000045	77 ⁽³⁾	0.0000051	95% Upper Confidence Limit

⁽¹⁾EPC derived from a combination of AE/WP tissue concentrations.

⁽²⁾95 percent UCLs calculated based on the data queries from PREmis and Contaminant Assessment and Reduction Project databases; samples included in the 95 percent UCL calculations are listed in Attachment 1 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b). 95 percent UCLs on the mean calculated using USEPA ProUCL software (Version 3.0); output files are included in Attachment 3 of the Risk Assessment (Appendix C of the FFS; Malcolm Pirnie, Inc., 2007b).

⁽³⁾Frequency of detects could not be determined for calculated totals. Not all constituents that make up the aggregate were detected in all of the samples.

⁽⁴⁾Total PCBs represent the non-dioxin-like PCBs.

⁽⁵⁾The EPC for total DDT is less than the sum of the EPCs for DDD, DDE, and DDT as a result of calculating 95 percent UCLs.

µg/g = microgram per gram (equivalent to ppm = parts per million)

Appendix C

**Supporting Tables for
Estimates of Future Hazards for Ecological Receptors**

Table C-1: Summary of Hazards for Benthic Macroinvertebrates – Sediment Benchmarks

COPEC	Monitored Natural Recovery		Primary Erosional Zone/ Primary Inventory Zone		Area of Focus	
	Year = 2018	Year = 2048	Year = 2018	Year = 2048	Year = 2018	Year = 2048
Copper	4.1E+00	2.1E+00	3.9E+00	2.0E+00	2.4E+00	1.2E+00
Lead	5.0E+00	2.3E+00	4.8E+00	2.2E+00	3.2E+00	1.5E+00
Mercury	1.0E+01	3.3E+00	9.1E+00	2.9E+00	4.1E+00	1.3E+00
Mercury (methyl)	1.0E+01	3.3E+00	9.1E+00	2.9E+00	4.1E+00	1.3E+00
LMW PAH	6.0E+01	6.0E+01	6.0E+01	6.0E+01	2.8E+01	2.8E+01
HMW PAH	5.0E+01	5.0E+01	5.0E+01	5.0E+01	3.6E+01	3.6E+01
Aroclor, Total	2.5E+01	5.7E+00	2.2E+01	5.1E+00	1.7E+01	3.9E+00
Dieldrin	1.0E+03	1.0E+03	9.4E+02	9.4E+02	2.3E+02	2.3E+02
Total DDT	1.2E+02	4.4E+01	1.1E+02	3.8E+01	4.4E+01	1.5E+01
TCDD TEQ (PCDD/F)	2.8E+02	7.5E+01	1.9E+02	5.6E+01	1.3E+01	4.0E+00
TCDD TEQ (PCBs)	2.5E-01	8.2E-02	2.3E-01	4.1E-02	1.6E-01	4.1E-02
Total TCDD TEQ	2.8E+02	7.5E+01	1.9E+02	5.6E+01	1.3E+01	4.1E+00
Total	1.6E+03	1.3E+03	1.4E+03	1.2E+03	3.8E+02	3.3E+02

Bolded values indicate hazards greater than 1.0

Table C-2: Summary of Hazards for Blue Crab – Critical Body Residues

COPEC	Monitored Natural Recovery				Primary Erosional Zone/ Primary Inventory Zone				Area of Focus			
	Year = 2018		Year = 2048		Year = 2018		Year = 2048		Year = 2018		Year = 2048	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Copper	2.3E+02	2.3E+01	1.1E+02	1.1E+01	2.2E+02	2.2E+01	1.1E+02	1.1E+01	1.3E+02	1.3E+01	6.7E+01	6.7E+00
Lead	6.4E-01	6.4E-02	3.0E-01	3.0E-02	6.1E-01	6.1E-02	2.8E-01	2.8E-02	4.0E-01	4.0E-02	1.9E-01	1.9E-02
Mercury	4.6E+00	4.6E-01	1.5E+00	1.5E-01	4.0E+00	4.0E-01	1.3E+00	1.3E-01	1.8E+00	1.8E-01	5.8E-01	5.8E-02
Mercury (methyl)	4.6E+00	4.6E-01	1.5E+00	1.5E-01	4.0E+00	4.0E-01	1.3E+00	1.3E-01	1.8E+00	1.8E-01	5.8E-01	5.8E-02
LMW PAH	1.1E+01	1.1E+00	1.1E+01	1.1E+00	1.1E+01	1.1E+00	1.1E+01	1.1E+00	5.3E+00	5.3E-01	5.3E+00	5.3E-01
HMW PAH	1.2E+01	1.2E+00	1.2E+01	1.2E+00	1.2E+01	1.2E+00	1.2E+01	1.2E+00	8.8E+00	8.8E-01	8.8E+00	8.8E-01
Aroclor, Total	2.8E+00	1.1E+00	6.3E-01	2.4E-01	2.5E+00	9.4E-01	5.6E-01	2.1E-01	1.9E+00	7.2E-01	4.3E-01	1.6E-01
Dieldrin	1.4E+00	1.7E-01	1.4E+00	1.7E-01	1.3E+00	1.6E-01	1.3E+00	1.6E-01	3.2E-01	4.0E-02	3.2E-01	4.0E-02
Total DDT	1.2E+03	1.2E+02	4.2E+02	4.2E+01	1.0E+03	1.0E+02	3.6E+02	3.6E+01	4.2E+02	4.2E+01	1.5E+02	1.5E+01
TCDD TEQ (PCDD/F)	9.1E+02	1.0E+02	2.4E+02	2.8E+01	6.0E+02	7.0E+01	1.8E+02	2.1E+01	4.2E+01	4.8E+00	1.3E+01	1.5E+00
TCDD TEQ (PCBs)	1.1E+01	1.2E+00	3.6E+00	4.2E-01	1.0E+01	1.2E+00	1.8E+00	2.1E-01	7.2E+00	8.3E-01	1.8E+00	2.1E-01
Total TCDD TEQ	9.2E+02	1.1E+02	2.5E+02	2.8E+01	6.1E+02	7.1E+01	1.8E+02	2.1E+01	4.9E+01	5.6E+00	1.5E+01	1.7E+00
Total	2.4E+03	2.5E+02	8.1E+02	8.4E+01	1.9E+03	2.0E+02	6.8E+02	7.1E+01	6.2E+02	6.4E+01	2.5E+02	2.5E+01

Bolded values indicate hazards greater than 1.0

Table C-3: Summary of Hazards for White Perch/American Eel – Critical Body Residues

COPEC	Monitored Natural Recovery				Primary Erosional Zone/ Primary Inventory Zone				Area of Focus			
	Year = 2018		Year = 2048		Year = 2018		Year = 2048		Year = 2018		Year = 2048	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Copper	2.8E+03	2.8E+02	1.4E+03	1.4E+02	2.7E+03	2.7E+02	1.4E+03	1.4E+02	1.7E+03	1.7E+02	8.4E+02	8.4E+01
Lead	1.0E+01	1.0E+00	4.7E+00	4.7E-01	9.8E+00	9.8E-01	4.5E+00	4.5E-01	6.4E+00	6.4E-01	3.0E+00	3.0E-01
Mercury	2.6E+01	2.6E+00	8.4E+00	8.4E-01	2.3E+01	2.3E+00	7.4E+00	7.4E-01	1.0E+01	1.0E+00	3.4E+00	3.4E-01
Mercury (methyl)	2.6E+01	2.6E+00	8.4E+00	8.4E-01	2.3E+01	2.3E+00	7.4E+00	7.4E-01	1.0E+01	1.0E+00	3.4E+00	3.4E-01
LMW PAH	1.8E+00	1.8E-01	1.8E+00	1.8E-01	1.7E+00	1.7E-01	1.7E+00	1.7E-01	8.2E-01	8.2E-02	8.2E-01	8.2E-02
HMW PAH	1.0E+00	1.0E-01	1.0E+00	1.0E-01	1.0E+00	1.0E-01	1.0E+00	1.0E-01	7.4E-01	7.4E-02	7.4E-01	7.4E-02
Aroclor, Total	4.9E+02	4.9E+01	1.1E+02	1.1E+01	4.4E+02	4.4E+01	9.9E+01	9.9E+00	3.4E+02	3.4E+01	7.6E+01	7.6E+00
Dieldrin	2.9E+00	2.9E-01	2.9E+00	2.9E-01	2.7E+00	2.7E-01	2.7E+00	2.7E-01	6.8E-01	6.8E-02	6.8E-01	6.8E-02
Total DDT	9.2E+03	2.0E+02	3.2E+03	7.0E+01	7.9E+03	1.7E+02	2.8E+03	6.0E+01	3.3E+03	7.1E+01	1.1E+03	2.5E+01
TCDD TEQ (PCDD/F)	5.3E+00	3.1E+00	1.4E+00	8.2E-01	3.5E+00	2.1E+00	1.1E+00	6.2E-01	2.4E-01	1.4E-01	7.5E-02	4.4E-02
TCDD TEQ (PCBs)	3.4E-02	2.0E-02	1.1E-02	6.6E-03	3.2E-02	1.9E-02	5.6E-03	3.3E-03	2.2E-02	1.3E-02	5.6E-03	3.3E-03
Total TCDD TEQ	5.3E+00	3.1E+00	1.4E+00	8.3E-01	3.5E+00	2.1E+00	1.1E+00	6.2E-01	2.6E-01	1.5E-01	8.1E-02	4.7E-02
Total	1.3E+04	5.5E+02	4.8E+03	2.3E+02	1.1E+04	5.0E+02	4.3E+03	2.1E+02	5.3E+03	2.8E+02	2.1E+03	1.2E+02

Bolded values indicate hazards greater than 1.0

Table C-4: Summary of Hazards for Mummichog – Critical Body Residues

COPEC	Monitored Natural Recovery				Primary Erosional Zone/ Primary Inventory Zone				Area of Focus			
	Year = 2018		Year = 2048		Year = 2018		Year = 2048		Year = 2018		Year = 2048	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Copper	1.2E+03	1.2E+02	5.9E+02	5.9E+01	1.1E+03	1.1E+02	5.6E+02	5.6E+01	6.9E+02	6.9E+01	3.5E+02	3.5E+01
Lead	1.8E+01	1.8E+00	8.5E+00	8.5E-01	1.8E+01	1.8E+00	8.1E+00	8.1E-01	1.1E+01	1.1E+00	5.3E+00	5.3E-01
Mercury	3.2E+00	3.2E-01	1.0E+00	1.0E-01	2.8E+00	2.8E-01	9.0E-01	9.0E-02	1.3E+00	1.3E-01	4.1E-01	4.1E-02
Mercury (methyl)	3.2E+00	3.2E-01	1.0E+00	1.0E-01	2.8E+00	2.8E-01	9.0E-01	9.0E-02	1.3E+00	1.3E-01	4.1E-01	4.1E-02
LMW PAH	1.5E+00	1.5E-01	1.5E+00	1.5E-01	1.5E+00	1.5E-01	1.5E+00	1.5E-01	6.9E-01	6.9E-02	6.9E-01	6.9E-02
HMW PAH	7.3E-01	7.3E-02	7.3E-01	7.3E-02	7.3E-01	7.3E-02	7.3E-01	7.3E-02	5.2E-01	5.2E-02	5.2E-01	5.2E-02
Aroclor, Total	1.2E+02	1.2E+01	2.6E+01	2.6E+00	1.0E+02	1.0E+01	2.3E+01	2.3E+00	7.9E+01	7.9E+00	1.8E+01	1.8E+00
Dieldrin	4.1E-01	4.1E-02	4.1E-01	4.1E-02	3.8E-01	3.8E-02	3.8E-01	3.8E-02	9.5E-02	9.5E-03	9.5E-02	9.5E-03
Total DDT	1.6E+03	3.5E+01	5.7E+02	1.2E+01	1.4E+03	3.0E+01	4.9E+02	1.1E+01	5.7E+02	1.2E+01	2.0E+02	4.3E+00
TCDD TEQ (PCDD/F)	2.6E+00	1.6E+00	7.1E-01	4.1E-01	1.8E+00	1.0E+00	5.3E-01	3.1E-01	1.2E-01	7.1E-02	3.8E-02	2.2E-02
TCDD TEQ (PCBs)	1.2E-02	6.9E-03	3.9E-03	2.3E-03	1.1E-02	6.6E-03	2.0E-03	1.2E-03	7.9E-03	4.6E-03	2.0E-03	1.2E-03
Total TCDD TEQ	2.7E+00	1.6E+00	7.1E-01	4.2E-01	1.8E+00	1.0E+00	5.3E-01	3.1E-01	1.3E-01	7.6E-02	4.0E-02	2.3E-02
Total	2.9E+03	1.7E+02	1.2E+03	7.6E+01	2.7E+03	1.6E+02	1.1E+03	7.1E+01	1.4E+03	9.1E+01	5.7E+02	4.2E+01

Bolded values indicate hazards greater than 1.0

Table C-5: Summary of Hazards for Great Blue Heron – Ingestion of Fish and Sediment

COPEC	Monitored Natural Recovery				Primary Erosional Zone/ Primary Inventory Zone				Area of Focus			
	Year = 2018		Year = 2048		Year = 2018		Year = 2048		Year = 2018		Year = 2048	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Copper	3.7E-01	1.2E-01	1.9E-01	6.3E-02	3.6E-01	1.2E-01	1.8E-01	6.0E-02	2.2E-01	7.3E-02	1.1E-01	3.7E-02
Lead	7.6E-01	3.8E-01	3.5E-01	1.8E-01	7.3E-01	3.6E-01	3.4E-01	1.7E-01	4.8E-01	2.4E-01	2.2E-01	1.1E-01
Mercury	2.9E+00	2.9E-01	9.2E-01	9.2E-02	2.5E+00	2.5E-01	8.1E-01	8.1E-02	1.1E+00	1.1E-01	3.7E-01	3.7E-02
LMW PAH	-	-	-	-	-	-	-	-	-	-	-	-
HMW PAH	-	-	-	-	-	-	-	-	-	-	-	-
Aroclor, Total	1.3E+00	3.2E-01	2.9E-01	7.3E-02	1.1E+00	2.9E-01	2.6E-01	6.5E-02	8.7E-01	2.2E-01	2.0E-01	4.9E-02
Dieldrin	4.4E-02	8.3E-04	4.4E-02	8.3E-04	4.1E-02	7.7E-04	4.1E-02	7.7E-04	1.0E-02	1.9E-04	1.0E-02	1.9E-04
Total DDx	1.3E+01	1.3E+00	4.5E+00	4.5E-01	1.1E+01	1.1E+00	3.9E+00	3.9E-01	4.5E+00	4.5E-01	1.6E+00	1.6E-01
TCDD TEQ (PCDD/F)	1.7E+01	1.7E+00	5.4E+00	5.4E-01	1.2E+01	1.2E+00	3.3E+00	3.3E-01	7.5E-01	7.5E-02	2.5E-01	2.5E-02
TCDD TEQ (PCBs)	1.4E+01	1.4E+00	3.6E+00	3.6E-01	1.3E+01	1.3E+00	3.1E+00	3.1E-01	9.6E+00	9.6E-01	2.4E+00	2.4E-01
Total TCDD TEQ	3.1E+01	3.1E+00	9.0E+00	9.0E-01	2.4E+01	2.4E+00	6.4E+00	6.4E-01	1.0E+01	1.0E+00	2.6E+00	2.6E-01
Total	5.0E+01	5.5E+00	1.5E+01	1.8E+00	4.0E+01	4.6E+00	1.2E+01	1.4E+00	1.8E+01	2.1E+00	5.1E+00	6.6E-01

Bolded values indicate hazards greater than 1.0

Table C-6: Summary of Hazards for Mink – Ingestion of Fish and Sediment

COPEC	Monitored Natural Recovery				Primary Erosional Zone/ Primary Inventory Zone				Area of Focus			
	Year = 2018		Year = 2048		Year = 2018		Year = 2048		Year = 2018		Year = 2048	
	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL	NOAEL	LOAEL
Copper	6.0E-01	3.6E-01	3.0E-01	1.8E-01	5.8E-01	3.5E-01	2.9E-01	1.7E-01	3.5E-01	2.1E-01	1.8E-01	1.1E-01
Lead	3.2E-01	1.7E-01	1.5E-01	7.8E-02	3.1E-01	1.6E-01	1.4E-01	7.5E-02	2.0E-01	1.1E-01	9.3E-02	4.9E-02
Mercury	9.0E-01	2.8E-01	2.9E-01	8.9E-02	8.0E-01	2.4E-01	2.6E-01	7.8E-02	3.6E-01	1.1E-01	1.2E-01	3.5E-02
LMW PAH	-	-	-	-	-	-	-	-	-	-	-	-
HMW PAH	5.8E-01	5.8E-02	5.8E-01	5.8E-02	5.8E-01	5.8E-02	5.8E-01	5.8E-02	4.2E-01	4.2E-02	4.2E-01	4.2E-02
Aroclor, Total	4.6E+00	3.8E+00	1.0E+00	8.7E-01	4.1E+00	3.4E+00	9.3E-01	7.8E-01	3.1E+00	2.6E+00	7.1E-01	5.9E-01
Dieldrin	5.8E-01	2.9E-01	5.8E-01	2.9E-01	5.4E-01	2.7E-01	5.4E-01	2.7E-01	1.3E-01	6.7E-02	1.3E-01	6.7E-02
Total DDt	1.3E-01	2.5E-02	4.4E-02	8.8E-03	1.1E-01	2.2E-02	3.8E-02	7.6E-03	4.5E-02	8.9E-03	1.6E-02	3.1E-03
TCDD TEQ (PCDD/F)	7.4E+02	2.7E+01	2.3E+02	8.3E+00	5.1E+02	1.8E+01	1.4E+02	5.0E+00	3.2E+01	1.1E+00	1.1E+01	3.8E-01
TCDD TEQ (PCBs)	6.4E+01	2.3E+00	1.8E+01	6.5E-01	6.4E+01	2.3E+00	1.8E+01	6.5E-01	4.5E+01	1.6E+00	9.1E+00	3.2E-01
Total TCDD TEQ	8.1E+02	2.9E+01	2.5E+02	8.9E+00	5.7E+02	2.1E+01	1.6E+02	5.6E+00	7.7E+01	2.8E+00	2.0E+01	7.0E-01
Total	8.1E+02	3.4E+01	2.5E+02	1.1E+01	5.8E+02	2.5E+01	1.6E+02	7.1E+00	8.2E+01	5.9E+00	2.1E+01	1.6E+00

Bolded values indicate hazards greater than 1.0